Prescribing Safety in Ambulatory Care: Physician Perspectives

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Abstract

Objective: This study was undertaken to describe physicians' views regarding ambulatory medication prescribing safety. **Methods:** We conducted 17 semistructured interviews among a sample of practicing physicians from 3 integrated health delivery systems. We asked about current safety practices, perceptions of ambulatory prescribing safety, and recommended approaches for improving prescribing safety. Using a content analysis approach, three investigators independently coded responses into thematic categories. For 90 percent of responses, investigators agreed on the coding. Discrepant response codes were resolved through consultation among the investigators. **Results:** Current prescribing safety practices most frequently noted by physicians included using reference material (e.g., guidelines on hand-held devices, online drug information, electronic formulary books), verbal communication with pharmacists, and attention to educational materials on medication prescribing (posters, educational alerts, and faxes). Some subjects reported using point-of-care information technology, i.e., personal digital assistant-based drug information, as very helpful. Other subjects used pharmacy support systems. The most commonly cited safety concerns were adverse events associated with drug-drug interactions, drug allergies and side effects, prescribing for the elderly, and chronic medication use. Commonly suggested new safety approaches ranged from low-cost initiatives such as education to improve patients' knowledge of current medications (e.g., prominently placed posters reminding patients to bring medications to the visit), to more elaborate electronic medical record-based alert systems that automatically flag potential errors. **Conclusions:** Despite a number of safety strategies currently in use, physicians perceive significant problems with ambulatory prescribing safety. Recommended solutions range from better patient education to employing new information technology, but their effectiveness may vary depending on the underlying cause of the prescribing safety issue.

Introduction

In 1999, the Institute of Medicine report, *To Err Is Human: Building a Safer Health System,* identified medical errors as a leading cause of death and injury in the United States.[1] Subsequently, there has been a renewed national emphasis on addressing patient safety. Much of this early work has focused on medication errors in hospital settings, which represent closed systems with clear paper trails

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on the medication ordering and delivery process. Hospitals also lend themselves to the creation of standardized systems that build safety into prescription ordering, processing, dispensing, patient education, medication administration, and monitoring processes. The largest proportion of health care, however, is delivered in doctors' offices and clinics, in which over 2 billion prescriptions are dispensed per year.[2] In fact, 75 percent of all physician visits end in the prescription of a drug.[3] The importance of outpatient prescriptions dispensed also increases with the introduction of new types of drugs and with the growing prevalence of chronic diseases as our population ages. Unfortunately, little is currently known about prescribing safety in the ambulatory setting.[4]

Outpatient medication errors are inherently difficult to study and manage because the processes involved in medication use (prescribing, prescription processing, dispensing, patient education, medication administration, and monitoring) may be distributed across several providers, different locations, and over time. There are few centralized pharmacy databases or integrated patient records with which one may identify or alert health care providers about potential prescribing concerns. There perhaps are fewer databases available with which one may monitor prescribing practices over time or evaluate the impact of quality improvement efforts to improve prescribing safety.

Despite these challenges, ambulatory prescribing safety is an area of need that cannot be ignored. An Institute for Safe Medication Practices white paper states that Americans are 10 times more likely to be hospitalized as result of a medication error than from an automobile accident.[5] An examination of U.S. death certificates during a 10-year period ending in 1993 found that fatal medication errors had increased 2.6-fold. Among outpatients, the number increased 8.5 times and may be even higher when one includes deaths that may be indirectly related to but not attributed to a medication error.[5] Another recent study also found that adverse medication events might be quite common in the ambulatory setting, and recommended increased monitoring for potential errors.[4] Little is known about physicians' perspectives on and current approaches for addressing ambulatory prescribing safety.

One approach to studying and reducing ambulatory medication errors is to use the information systems within integrated delivery systems (IDS) to detect medication errors and to evaluate interventions to reduce errors. The 10-member Health Maintenance Organizations (HMO) Research Network, through the support of the Agency for Healthcare Research and Quality (AHRQ), is now conducting such an effort—the HMO Research Network Center for Education and Research in Therapeutics (CERT) Prescribing Safety Study, using a shared database of 2 million health plan members. This paper describes the qualitative work conducted by one of the CERT Prescribing Safety research teams as part of the study of an academic detailing intervention across three IDSs to improve medication safety.

Systematic reviews of interventions to improve the quality of provider prescribing suggest that academic detailing is the most effective intervention among those studied.[6, 7] Specifically, academic detailing involves the delivery of

simple, focused educational messages to physicians by a credible colleague, and encourages physician participants to actively discuss and consider practical approaches to achieve the desired outcome. In preparation for academic detailing, investigative surveys, interviews, or focus groups with physician representatives of the target group can help identify baseline knowledge and motivations for current prescribing patterns.[8] This information helps tailor the academic detailing messages and ensures the messages are consistent with the physicians' values, attitudes, and beliefs. This paper describes the results of provider interviews to better understand their views of outpatient medication safety issues.

Methods

Study setting and physician sample

The characteristics of the three integrated delivery systems, all of which are members of the HMO Research Network and the CERT Prescribing Safety Study, are displayed in Table 1.

Table 1. Characteristics of three integrated delivery systems (1999 data)[*]

Characteristics	A	B	C
Structure, %			
Group	0	100	0
Staff	33	0	60
Independent Phys. Assn. (IPA)	66	0	40
Population age			
< 24	37	34	37
24–44	36	31	29
45–64	25	25	23
65+	2	9	11
Female, %	52	51	53
Race/ethnicity, %			
White	91	67	58
Black	4	6	1
Asian	3	13	1
Hispanic	2	10	38
Other	1	2	2
Retention (1-year) of cohort, %	84	90	85
Enrollment by product line, %			
Commercial	92	88	71
Medicare	5	10	9
Medicaid	3	2	21

* Numbers do not add up to 100 because of rounding

We conducted 17 semistructured interviews among a purposeful sample of practicing physicians from the three systems. The sample included five physicians each from two of the systems, and seven physicians from the third system. We selected the sample to achieve a balance between adult primary care physicians trained in family medicine and internal medicine and between genders, and to ensure that the respondents were experienced ambulatory care clinicians. There were 7 physicians trained in family medicine and 10 trained in internal medicine; there were 10 males and 7 females. Sixteen of the physicians were full-time ambulatory care clinicians. The respondents had been in practice for an average of 14.2 years, with 10 of the physicians having practiced for 10 or more years. On average, the physicians reported that 83.9 percent of their workweek was involved in patient care, with responses ranging from 40 percent to 100 percent.

Survey methodology

We used a semistructured questionnaire to guide the interviews; the research team developed, pretested, and revised the questionnaire. The questionnaire included open-ended questions asking for the physicians' opinions about three facets of ambulatory prescribing safety: current strategies and resources used in the physician's clinic to promote safe medication use, clinically significant medication prescribing issues, and effective prescribing safety strategies. Two members of the research team conducted each interview: one person acted as the interviewer and the other served as the recorder. At the beginning of the interview, the interviewer explained, "The purpose of this interview is to explore your perceptions of outpatient medication safety. Most emphasis has been placed on inpatient safety issues—we want to explore outpatient safety. We want to learn about your views and opinions regarding the clinical importance of potential medication safety issues in your practice setting." The respondents were assured that their name, title, and other personal information would be kept confidential. The interviews took approximately 45 minutes to complete.

The interviewers recorded each subject's responses in field notes. The field notes were then analyzed using a content analysis approach.[9] Three investigators independently coded responses to each question to identify (1) strategies and resources currently used to promote safe medication use, (2) medication prescribing safety concerns, and (3) suggested methods for addressing drug prescribing problems. For each of the three issues identified above, similar answers were grouped together to establish response categories or themes. The coders were in agreement on the categorization of respondents' statements into thematic categories in 90 percent of the cases. For those statements where the analysts did not agree on categorization into a theme, the analysts conferred and made final classification decisions jointly.

Results

Strategies and resources currently available in physicians' clinics to promote safe medication use

The respondents were asked, "Please share with me the strategies you use and the resources that are available in your clinic to promote safe medication use." We collapsed all answers into eight types of strategies or resources, as shown in Table 2.

Table 2. Strategies and resources currently available to promote safe medication use

Strategy or resource	Number of respondents citing the strategy or resource (max = 17)
Electronically available guidelines, e.g., readily accessible guidelines on Palm Pilot™, intranet, electronic formulary, or online drug information database	14
Direct verbal communication with pharmacists	12
Posters, educational alerts, faxes	7
Paper-based drug reference guides (books)	6
Communication with other (nonpharmacy) staff, e.g., physicians and nurses	6
Current patient medications list in the health record	4
Exhaustive medication review and talk with patient	2
Departmental educational meetings	1

The most frequently mentioned strategies/resources were the use of reference material (guidelines on hand-held devices, online drug information, electronic formulary), verbal communication with pharmacists, and attention to educational materials on medication prescribing (posters, educational alerts, and faxes). Some respondents emphasized the advantages of using point-of-care technology, such as hand-held devices with decision-support software for medication prescribing. One respondent said, "I highly recommend it (personal digital assistant-based drug information). It's really helpful. I pull it out in front of patients if I want to look something up. I think everyone should have it." Respondents also noted the value of pharmacy support systems. One said, "In [our system] there is a pharmacy call center for questions. There's no shortage of help if you have questions."

When the respondents were asked which of these strategies or resources produced the most positive results, two strategies were mentioned most frequently: using electronic guidelines (eight mentions) and verbal communication with pharmacists (six mentions).

Medication prescribing safety concerns

We also asked respondents about their prescribing safety concerns. After asking for the respondent's opinions regarding five specific medication prescribing issues (reported below), we asked, "Are there any other clinically important medication safety issues that come to mind?" Thirteen (76 percent) respondents expressed safety concerns. The most commonly cited concerns were (1) adverse events associated with drug-drug interactions, (2) drug allergies and side effects, (3) prescribing for the elderly, and (4) chronic medication use. The most frequently mentioned medication safety concern was "adverse events associated with drug-drug interactions" (25 mentions).

One physician described the general problem: "There are a lot of interactions, and a lot of potential side effects … so many people are on a lot of medications, and it's hard to know that. Sometimes we make patients feel bad because we prescribe them bad combinations of medications." Some responses were quite specific, such as, "Diabetic patients on multiple medications are of concern. Some patients use multiple medications, like Actos, Metformin, insulin, and Glycet … sometimes the combination may put them at risk for low blood sugar." Other responses focused on the difficulty physicians have in managing patients' medications when medications are being prescribed by more than one doctor: "Problems can arise when multiple doctors are prescribing for the same patient, such as when a patient is being treated by a primary care physician and a specialist, or when a patient goes into urgent care and gets treated by a different doctor." The potential risk of drug interactions when the patient is using over-the-counter drugs was also noted: "Problems can occur if patients are taking over-the-counter medications without knowing what the active ingredient in the drug is, such as taking Tylenol OTC (over the counter), and getting prescribed Vicodin, which can result in too much acetaminophen."

These examples point to a broader medication management issue, the rapidly increasing array of drugs available for use by physicians, captured in the following comment: "There are more drugs than ever and therefore there is more potential for interaction." Another respondent expressed his concern about the result of the inherent inability of physicians to maintain complete knowledge of attributes and uses of new medications: "There has been an explosion of pharmaceutical knowledge, and doctors are unable to keep up with current knowledge." Some physicians expressed concern that they were often put in the position of prescribing drugs for a patient without knowing what other drugs the patient was taking because, if the patients did not reveal their medications, the physician could prescribe interacting drugs.

The physicians also reported safety concerns involving "drug allergies and side effects" (12 mentions). Concerns about drug allergies were mentioned specifically with respect to prescriptions for antibiotics: "This is a pretty basic one. In urgent cases you may not get the medical chart (and, therefore, not know that the patient has an allergic reaction to certain antibiotics)." Medication side effects of various types were mentioned, including "not stopping glucophage treatment if patient is dehydrated or sick"; "the chronic use of nonsteroidal anti-

inflammatory drugs (NSAIDs) in patients with gastrointestinal bleeding and renal insufficiency"; and "prescription of diuretics and not checking patient's electrolyte levels regularly."

The third most commonly cited concern was safety of prescribing drugs for the elderly (11 mentions). Several specific drug prescribing issues were mentioned, e.g., Clonidine in geriatrics, which may result in hypotension leading to a stroke and transient ischemic attack (TIA); benzodiazepine use in the elderly, which can increase dementia; use of sedatives to help elderly persons sleep; and prescription of diuretics without checking patient's electrolyte levels regularly. Several physicians noted that prescribing for the elderly has become more risky as life expectancy has increased. As one respondent said, "The 'elderly' are now really, really elderly. They are not 65-year-olds any more." Another physician noted, "We have these quality initiatives like hypertension control … and we're treating 85-year-olds with drugs that will knock them out just to lower their blood pressure."

Another concern frequently mentioned was the safety of chronic medication use (nine mentions). Again, some responses were quite specific about the dangers associated with prolonged use of certain drugs, such as "overuse and/or prolonged use of H2 blockers like Zantac and Proton Pump Inhibitors like Prilosec that may interact with other medications." Other respondents gave more general concerns about prolonged use, particularly when such use can be facilitated by automatic prescription refills. One respondent said, "You probably haven't seen a patient in a while and you just automatically refill prescriptions without checking or thinking about the electrolyte levels."

Physicians' suggested methods to address medication prescribing problems

In order to provide respondents with some focus for their thinking about methods for improving medication prescribing safety, we asked them to make suggestions in the context of five specific medication prescribing issues: (1) prescription of indomethacin for the elderly; (2) prescription of propoxyphene for the elderly; (3) prescription of metformin and not checking creatinine level; (4) prescription of angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), or diuretics and not checking the serum potassium and creatinine levels; and (5) concurrent prescription of warfarin and NSAIDs. We asked if they agreed that the respective medication prescribing issue was clinically important, why they thought the problems occur, and what methods they could suggest to address the problem.

In general, the respondents suggested solutions consistent with their perceptions of the underlying problem. The solutions ranged from relatively low-cost options, addressable at the individual clinic level, to more-costly options best addressed at the system level. For example, respondents frequently reported lack of physician awareness of the associated risks as the reason for physicians' use of indomethacin for the elderly; in turn the most commonly suggested solution to improve prescribing safety in this area was more physician education (10

mentions). Similarly, more physician education was the most frequently cited method for addressing the use of propoxyphene for the elderly (seven mentions). For both of these prescribing issues, the use of clinical information technology for monitoring, followup, or providing alerts and reminders was mentioned by several respondents.

In contrast, information technology-based solutions were the most frequently mentioned method to address laboratory monitoring issues with respect to prescribing Metformin (16 mentions) and ACE-inhibitors, ARBs, or diuretics (10 mentions). Examples of these technology-based solutions include electronic reminders to the physician, electronic pharmacy profiles, and electronic refill systems that list recent laboratory tests and/or regularly update medication lists. Other methods suggested by respondents for improving laboratory monitoring included more physician education, more patient education, providing easily accessible guidelines and other decision support tools, establishing common monitoring practices, and changing the culture of the clinic. Of these, more physician education was mentioned the most (five mentions).

Finally, with respect to the concurrent prescribing of warfarin and NSAIDs, the most frequently mentioned methods to address the problem were more information technology for monitoring, followup, alerts, and reminders (six mentions); more patient education (six mentions); and more accessible guidelines and information on interactions (six mentions). Other suggestions included establishing a Coumadin (warfarin) clinic/disease management program (five mentions), better communication between the clinic and the primary care provider (three mentions), more physician education (three mentions), and more time allotted to the patient visit (one mention).

Discussion

To our knowledge, this is one of the few studies to elicit physician perspectives on ambulatory medication prescribing safety. In this study, physicians reported on currently available resources and approaches for promoting prescribing safety in ambulatory settings. Despite these existing prescribing safety resources, physicians expressed ongoing concerns about prescribing safety in the outpatient setting. They also offered solutions based on their perceptions of the underlying problem in a given clinical scenario. These solutions ranged from relatively low-cost options to options that require sizable investments in technology and personnel, and also varied with the respondent's perceptions of the underlying problem with each prescribing scenario. There was general agreement that no single approach could address all prescribing safety concerns.

The physicians reported a number of currently available resources, including electronic guidelines; direct verbal communication with pharmacists; posters, education alerts, and faxes; paper-based reference guides (such as pharmacy newsletters); communication with other physicians and nurses; and having a current patient medications list in the health record.

Despite these resources, physicians cited a number of persistent prescribing safety concerns including adverse events associated with drug-drug interactions, drug allergies and side effects, prescribing for the elderly, and prescribing chronic medications. Physicians also identified a range of potential underlying problems, which varied with the clinical scenario. For some safety issues, physicians reported limited knowledge about risks associated with individual medications or patient characteristics. For this type of problem, physicians offered relatively low-cost potential solutions, including education or academic detailing. For other safety issues, physicians identified more complex problems, such as difficulty integrating care across multiple prescribing physicians or challenges in managing medication information. For this type of problem, physicians suggested information technology-based solutions such as automated drug-drug interaction reminders, or changes in the system of care such as developing specialized monitoring clinics. Indeed, many of the physicians reported a strong interest in technology-based solutions.

There are several important implications of our findings. First, physicians in our study appeared to be receptive to interventions to improve prescribing safety. In contrast to our findings, Blendon et al. identified limited physician concern about prescribing safety.[10] Other authors have found similar general support for safety work, but less physician consensus on the level of urgency or the magnitude of medical errors.[11–13] One explanation for this difference is that we framed the issues not just as medical errors, but rather as approaches to improve overall prescribing quality. It is possible that greater emphasis on improving overall quality may engender greater physician support than a focus only on errors. Indeed, greater involvement of physicians in the safety dialogue could prove valuable.[14–16]

Second, some types of prescribing safety concerns may be amenable to low-cost solutions. Potential low-cost solutions include academic detailing efforts for select areas with low physician awareness of medication safety issues. While harm from medication errors represents a significant national concern, many individual health care systems and providers make difficult resource allocation decisions between new investments and providing direct patient care; moreover, the trade-offs become stark as health care costs and resource constraints continue to increase. Few groups today may have the financial and organizational resources needed to enact fundamental changes in the system of care, e.g., integration of clinical information systems with carefully constructed, system-specific, embedded decision support or allocation of new pharmacists to each clinic. Given the potential magnitude of ambulatory medication errors in the United States, it is vital that we identify solutions that are feasible in the majority of delivery settings. Low-cost, system-independent solutions represent one type of broadly feasible solution.

The CERT Prescribing Safety Study currently has three concurrent efforts: two focus on solutions dependent on computer-based physician order entry (CPOE) systems for settings with advanced health information technology; one focuses on an academic detailing effort that could be feasible in the majority of

delivery settings. Based on our interviews, we suspect that many more potential solutions may be needed, each focused on the root cause.

The major limitation of our study is uncertainty about the generalizability of our findings. First, this was a qualitative study with limited quantitative information. Second, we had a limited sample of physicians and used a convenience sample of volunteers, which could limit the internal validity of our results. However, discussions with physicians during the academic detailing sessions have reinforced these findings. Third, all of the health systems were relatively large integrated delivery systems, which arguably may have greater resources available than many provider groups across the country. Nevertheless, these findings represent an appropriate starting point and yield valuable information. Replication of these findings in other settings and with larger samples of physicians is needed.

In conclusion, physicians in our study perceived significant problems with ambulatory prescribing safety, despite a number of safety strategies currently in use. Recommended solutions range from better patient education to new information technology, but their effectiveness may vary, depending on the underlying cause of the prescribing safety issue. No one solution may address all prescribing safety concerns, nor may one solution be appropriate for all providers or in all provider groups.

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